SECTION 02220

EXCAVATION, BACKFILLING, AND COMPACTION

****
Edit to suit project requirements.
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PART 1 GENERAL

1.1 SECTION INCLUDES

A. Excavate, place, and compact earth at the site.

1.2 LANL PERFORMED WORK

A. Soils testing

B. Obtain excavation/soil disturbance permit for Contractor.

1.3 SUBMITTALS

A. Submit the following in accordance with the requirements of Section 01300.

1. Material certification meeting the specifications for base course materials from an independent testing laboratory.

1.4 QUALITY ASSURANCE

A. When work or portions of work of this Section are completed and require testing, notify the Contract Administrator.

B. Ensure compacted fills are tested in accordance with Section 3.4 and in compliance before proceeding with placement of next lift.

C. Do not begin any ground breaking until the known utilities have been marked and an excavation/soil disturbance permit has been issued to the Contractor.

1.5 JOB CONDITIONS

A. Do not place and compact backfill material when the atmospheric temperature is below 35 degrees F, unless approved by the Construction Inspector.

1.6 REGULATORY REQUIREMENT

A. Comply with OSHA 2207, 29CFR 1926, during excavating operation.

1.7 PROTECTION

A. Protect existing structures from equipment and vehicular traffic.

B. Protect existing utilities.

C. Maintain excavation free of standing water.

D. Notify Construction Inspector of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.

E. Protect bottom of excavations and soil adjacent to and beneath foundations from frost.

F. Grade top perimeter of excavation to prevent subsurface water run-off into excavation.

PART 2 PRODUCTS

2.1 MATERIALS

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Specify all earthen materials (soil and aggregate) to be used for fill or backfill in this section.
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A. Fill and Backfill Material

1. Material consisting of non-plastic granular soils free of organic or other deleterious materials and should have a maximum particle size of 2 inches.

2. Obtain borrow material from the [Location of Borrow/Spoils Area] borrow/spoils site or other site approved by the Contract Administrator.

B. Base Courses

1. Provide base course aggregate conforming to the New Mexico State Highway and Transportation Department (NMSHTD) Standard Specifications for Roadway and Bridge Construction, 1994 Edition. Conform to NMSHTD Specification for gradation, testing, and acceptance of base course aggregate, except as specified below.

2. Provide base course and aggregate composed of materials consisting of crushed stone, crushed or screened gravel, sand, or a combination of such materials. Provide base course and aggregate free from vegetable matter and all other deleterious materials, including slit and clay balls.

3. Provide the materials well blended and complying with the following requirements:

a.

SIEVE SIZE	% PASSING
1"	100
3/4"	80 - 100
No. 4	30 - 60
No. 10	20 - 45
No. 200	3 - 10

b. Regulate the amount of crushing so that at least 50 percent, by dry weight, of the plus No. 4 sieve material has 2 fractured faces.

c. Liquid limited and plasticity index: per ASTM D4318.

Material passing the No. 40 sieve:

Liquid Limit - 25 or less
Plasticity Index - 5 or less

d. Los Angeles Abrasion per ASTM C131.

Coarse Aggregate percent wear - 50 or less

e. Soundness (5 cycle magnesium sulfate solution) per ASTM C88

Soundness Loss - 18 or less.

PART 3 EXECUTION

3.1 PREPARATION

A. Identify required contours and datum.

B. Notify the Construction Inspector 5 days prior to startup of construction to have LANL's support services subcontractor identify known underground utilities and stake and flag locations. If a conflict exists between the location of such obstacles and the proposed work, promptly notify the Construction Inspector and arrange for relocations. Proceed in the same manner if a rock layer or any other condition encountered underground make changes advisable.

C. Maintain and protect existing utilities in work area.

3.2 EXCAVATION

****
Specify project specific requirements.
****

A. Excavate subsoil as required for the Work.

B. Cut slopes in sound tuff rock material at one horizontal to four vertical or less. When cutting in soil, slope at 2 horizontal to 1 vertical or less, unless shored.

C. Hand trim excavation and leave free of loose matter.

D. Remove lumped subsoil, boulders, and rock.

E. Correct errors in excavation.

3.3 BACKFILLING

****
Specify project specific requirements.
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A. Backfill and fill areas to contour lines and elevations shown on the Drawings.

B. Backfill and fill systematically.

C. Do not place backfill or fill material over frozen, wet, or spongy subgrade surfaces, including surfaces containing frost or ice.

D. Recondition, reshape and recompact areas that are damaged by freezing.

E. Place backfill and fill materials in continuous layers not exceeding 8 inches in loose depth.

F. Before compacting, moisten or aerate each layer as necessary to provide the optimum moisture content.

G. Compact each layer to required percentage of maximum density for the area.

H. Compact layers uniformly before a succeeding layer is placed.

I. Do not disturb or damage adjacent structures during compaction.

J. Backfill against structures as follows:

1. Do not place backfill against structure walls prior to verifying the concrete has been properly cured and is of required strength.

2. Take care to prevent wedging action of backfill against structures by carrying the material uniformly around the structures to approximately the same elevation in each lift.

3. When unbalanced pressures are likely to develop on walls:

   a. Continuously monitor for displacements,

   b. Erect shoring to counteract imbalance, if required, and

   c. Leave shoring in place until its removal is approved by the Contract Administrator.

3.4 COMPACTION

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Specify compaction requirements for each location.
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A. Control soil compaction during construction to provide the minimum percentage of density specified for each area as determined according to ASTM D1557, method A or D.

B. Where subgrade or layer of soil material must be moisture-conditioned before compacting, uniformly apply water to surface of subgrade or layer material to prevent free water appearing on surface during or subsequent to compacting operations.

C. Remove and replace, or scarify and air dry, soil material that is too wet to permit compacting to the specified density.

D. The allowable percent variation from optimum moisture is minus 0 percent to plus 2 percent.

E. The paragraphs below identify location, and compaction expressed as a percentage of maximum density and optimum moisture in comparison with ASTM D1557.

1. Compact fill beneath concrete and asphalt structures to [95 percent] of maximum density.

2. Compact fill beneath unpaved areas to [90 percent] of maximum density.

3.5 FIELD QUALITY CONTROL

A. A certified independent testing agency will be employed by LANL to perform testing.

B. The Contractor is responsible for the following:

1. Verify all fill material to be placed is within the specifications of Section 2.1, and all laboratory testing is complete.

2. Verify that moisture-density relationship, ASTM D1557, for each soil type to be placed is completed.

C. LANL will perform the following testing:

1. Determine field density of in-place material in accordance with any of the following methods:

   a. Nuclear Method, ASTM D2922,

b. Rubber-Balloon Method, ASTM D2167.

c. Sand-Cone Method, ASTM D1556.

2. Determine field moisture content in accordance with either of the following methods:

a. Nuclear Method, ASTM D3017, or

b. Laboratory Determination, ASTM D2216.

3. Frequency of Tests

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Specify location and frequency of testing.
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a. One test per [2000] square feet for each lift of compacted fill material or fraction thereof, but not less than [3] tests per 8 inch maximum lift.

END OF SECTION